

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An instrument for gripping an orthopaedic fixation pin during a surgical procedure and extracting the pin from bone in which the pin is embedded, the pin having an embedded portion extending into the bone along a longitudinal axis, and a projecting portion projecting longitudinally from the bone adjacent a bearing surface associated with the bone, the instrument comprising:

a first handle member;

a second handle member coupled with the first handle member for selective movement relative to the first handle member between a first position and a second position;

a pusher coupled with the first and second handle members for movement relative to the first and second handle members in directions along a linear path essentially parallel to the longitudinal axis in response to movement of the second handle member between the first and second positions; and

a gripping mechanism including first and second gripping elements coupled with the first and second handle members for movement to grip the projecting portion of the pin between the first gripping element and the second gripping element in response to an initial movement of the second handle member from the first position toward a second position;

the second handle member being coupled to the pusher such that upon movement of the second handle member relative to the first handle member farther toward the second position, subsequent to the initial movement, the pusher is urged against the bearing surface to move the gripping mechanism away from the bearing surface and to establish an extraction force in a direction essentially parallel to the longitudinal axis, and the gripped projecting portion of the pin is moved with the gripping mechanism to withdraw the embedded portion of the pin from the bone along a direction essentially parallel to the longitudinal axis.

2. The instrument of claim 1 wherein the pusher comprises a plunger mounted upon the first handle member for sliding movement in directions essentially parallel to the longitudinal direction.

3. The instrument of claim 1 wherein the second handle member is mounted for pivotal movement relative to the first handle member.

4. The instrument of claim 1 wherein:
the first gripping element includes a gripping surface integral with the first handle member;

the second gripping element includes a gripping finger mounted upon the first handle member for movement toward and away from the gripping surface; and

a linkage system couples the second handle member with the gripping finger for movement of the gripping finger laterally toward the gripping surface in response to movement of the second handle member from the first position toward the second position.

5. The instrument of claim 4 wherein the pusher comprises a plunger mounted upon the first handle member for sliding movement in directions essentially parallel to the longitudinal direction.

6. The instrument of claim 5 wherein the projecting portion of the pin includes an external contour configuration, the gripping surface includes a contour configuration complementary to a first portion of the external contour configuration of the projecting portion of the pin, and the plunger has a contour configuration complementary to a second portion of the external contour configuration of the projecting portion of the pin, whereby the external contour configuration of the pin essentially is confined closely between the gripping surface and the plunger.

7. The instrument of claim 6 wherein the external contour configuration of the projecting portion of the pin comprises a

cylindrical contour configuration, and the complementary contour configurations of the gripping surface and the plunger each comprise a partially cylindrical contour configuration.

8. The instrument of claim 5 wherein the plunger is mounted for movement between a retracted position, wherein the plunger is retracted toward the first handle member, and an advanced position, wherein the plunger is advanced from the first handle member against the bearing surface, the instrument including:

a biasing mechanism for biasing the plunger toward the retracted position with a predetermined biasing force; and

an actuator carried by the second handle member for urging the plunger toward the advanced position, against the predetermined biasing force of the biasing mechanism, in response to movement of the second handle member from the first position toward the second position.

9. The instrument of claim 8 wherein the linkage system is configured for urging the gripping finger toward the gripping surface to establish a gripping force, in response the initial movement of the second handle member toward the first handle member, and for urging the plunger toward the advanced position to establish an extraction force in response to movement of the second handle member beyond the initial movement toward the second

position, with the gripping force established prior to establishment of the extraction force, by virtue of the predetermined biasing force.

10. The instrument of claim 9 wherein the actuator includes an arm on the second handle member, the arm being coupled with the biasing mechanism such that the biasing mechanism biases the second handle member toward the first position.

11. The instrument of claim 10 wherein the biasing member includes a spring positioned and configured for biasing the plunger toward the retracted position and the second handle member toward the first position.

12. A method for gripping an orthopaedic fixation pin during a surgical procedure and extracting the pin from bone in which the pin is embedded, the pin having an embedded portion extending into the bone along a longitudinal axis, and a projecting portion projecting longitudinally from the bone adjacent a bearing surface associated with the bone, the method comprising:

gripping the pin along the longitudinally projecting portion by gripping the longitudinally projecting portion between first and second gripping elements movable laterally relative to one another

to grip the longitudinally projecting portion of the pin within a gripping mechanism with a gripping force; and

urging a plunger against the bearing surface in a direction parallel to the longitudinal axis to move the gripping mechanism along a longitudinal direction of movement parallel to the longitudinal axis, away from the bearing surface, to pull the embedded portion of the pin from the bone with a withdrawal force.

13. The method of claim 12 including biasing the plunger away from the bearing surface with a predetermined biasing force, and coupling the gripping mechanism with the plunger such that the gripping force is established prior to the withdrawal force by virtue of the predetermined biasing force.

14. The method of claim 12 including:

retracting the plunger in a direction away from the bearing surface, subsequent to pulling the embedded portion of the pin partially out of the bone;

releasing the gripping mechanism from the longitudinally projecting portion of the pin subsequent to pulling the embedded portion of the pin partially out of the bone;

subsequently gripping the pin along the longitudinally projecting portion by gripping the longitudinally projecting

portion between the first and second gripping elements of the gripping mechanism; and

again moving the gripping mechanism along a longitudinal direction of movement parallel to the longitudinal axis, away from the bearing surface, to further pull the embedded portion of the pin from the bone;

until the embedded portion is fully withdrawn from the bone.